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An
Inaugural Essay on
Injuries of the Head
For
The Degree of Doctor of Medicine,
In the University of Pennsylvania
By
Peyton R. Berkeley
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Philadelphia of Virginia.
January 1828.

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By injuries of the head we mean such as are produced by external violence, consequently, not including those which arise from internal disease, or mal-conformation of the organs essential to the healthy functions of this important member of the human system. The most natural division of the subject is suggested by the arrangement of the parts most usually affected: viz: Injuries of the Scalp. of the Cranium; of the Membranes and of the brain itself-

Simple incised wounds of the Scalp are to be treated as similar wounds in any other part; the surgeon, however, should constantly bear in mind the great necessity of immediate union. The danger of permitting suppuration in such cases can be readily perceived when we recollect the immediate and intimate connection existing between the periosteum and bone; the free interchange of vessels between the periosteum & Duraccitates; and the great probability that the brain must be affected, should these connections be by any means deranged. It is owing

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to this connection that even an experienced surgeon can with so little certainty foretell the termination of the most superficial injury of the head. To day all may appear well, healthy granulations, wound mattering well, patient free from pain; let the least transfer of irritation to the D. M. be produced (and to effect this it is only necessary that the connecting vessels be disturbed) and all these favourable symptoms vanish, and that without warning to the surgeon by which such a change might have been foretold. Certain it is, that there is no branch in surgery which so completely baffles the skill of the surgeon to give a correct prognosis, the most horrid injuries frequently resulting in the most perfect cure; and the reverse being often the sad termination of those which at first scarcely excited attention.

Punctured wounds are much the most dangerous. This remark, true to a certain extent, as respects the whole system, is most strikingly exemplified in wounds of the scalp. This we think may be attributed to two causes 1st The weapon, with which such wounds are made, from its construction, is usually driven directly against the bone, and consequently is more liable to injure the cranium

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than when it is of such a nature as only to cut through or pare off the scalp. 2d. The wound is small and deep, the matter, should it be formed, has no sufficient aperture for its escape, and being thus confined is more liable to affect the interchanged vessels of the Pericranium and D. M. than in wounds of almost any other description. Hence the size of a wound is no evidence of the extent of injury. Various other considerations are to be taken in to form even a probable conclusion of what may be the result. Punctured wounds do not always extend entirely to the bone, but only through particular portions of the scalp, as Cutis Vera, tendons of the muscles &c. According to Pott, the effects of the injury will in many cases indicate the extent of injury. Thus should the wound not extend to the Aponeurotic Expansion, the unfavourable appearances, should any follow, will not be confined to the part injured, but will include the head and face. In his own language, "the skin wears a yellowish tint, and is sometimes thick set with small blisters; it receives the impression of the fingers, and becomes pale for a moment, but soon returns to its inflamed colour; it is not very painful to the touch, and the eyelids and ears are al-

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ways included in the tumefaction, the former of which are sometimes so much distended as to be closed; a fevourish heat and thirst generally accompany it. the patient is restless - has a quick pulse - most commonly nausea and inclination to vomit". According to that able writer, this affection, as just described, is only found in bilious habits; By one not accustomed to it, great danger might be apprehended; but Pott assures us this apprehension is entirely unfounded. It is an inflammatory affection, and although partaking in some degree of the Erysipelatous Affection which frequently follows injuries of the head, yet it is less dangerous, and may be distinguished. In the first place, that dependant on a bilious habit, makes its appearance in a short time after the injury is inflicted, one or two days: whereas Erysipelas is slow and gradual; the former is comparatively mild; the latter violent; a quick, hard, chorded pulse; excessive heat; violent pain in the head; extreme anxietely and restlessness; and not unfrequently cold shiverings. In both species the wound has an unhealthy appearance, but in the latter the scalp is seperated from the cranium. The treatment of this more simple Affection is very simple.

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Rest, purgatives, Blisters, venesection, in other words the Anti-phologistic treatment, regulated according to circumstances, is all that is required. This simple treatment will often affect a cure. Where the system is in a phlogosed state, and the inflamation proves obstinate, the division of the scalp is recommended, and is often a means of expediting the cure. This will generally prevent sloughing, and consequently diminist danger. This practice, Division of the Scalp, is also recommended where blood has been extravasated under the scalp, forming a small round tumour. The most simple treatment of such Tumours is that recommended by Mr. S. Cooper. It consists in mild purges, and a lotion composed of Acidum Acticum (Vinegar) and Muriate of Amonia. Yet when this fails, the incision must be resorted to.

The indication in all incised wounds is the same. The parts are to be placed in exact approsition, and thus retained. This can be affected in two ways - by the interupted suture or adhesive straps - For wounds of the scalp the straps are vastly preferable, and should always be prefered, where they will answer the purpose intended. To apply them to the head, it is necessary that it be previously shaved. The straps

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a sutures, with the antiphlogistic regimen, is as much as simple incised wounds of the scalp generally demand.

With regard to the treatment of those cases where considerable portions of the scalp have been torn up, surgeons of eminence once greatly differed, although, at present, we believe, no fact is more generally admitted than that the part should be replaced, and every exertion made to preserve it. Unless the flap be entirely separated, a surgeon can never be justifiable in pursuing any other course. It is undoubtedly correct, since it prevents deformity, and in no respects militates against the speedy recovery of the patient. In many cases where such an attempt would appear useless, union is accomplished, even where matter has been formed beneath the flap requiring several perforations for its evacuation.

The entire removal of the scalp, the bone immediately beneath being left bare, is sometimes the effect of a severe blow on the cranium. It has often occured to me to examine whether under such circumstances, exfoliation be a necessary consequence. This question has been satisfactorily answered by a short note in Pott. He says it depends

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on other circumstances besides the mere removal of the scalp and Periosteum. The solidity of the surface of the bone, the size of the vessels, and the impulse of the blood through them, are what principally determine it. If the bone be favourable in these particulars, a granulation of flesh will be generated on the surface of the bone, which will cover and firmly adhere to it, without throwing off the smallest exfoliation, especially in young subjects. On the contrary if the circulation is interrupted in the bone, either by its natural density and hardness, or by the applications of art, it must part with a scale to a certain depth - that is that part of the surface, through which the circulation ceases to be carried on, will be seperated from and cut off by the vessels which nourish the rest of the bone.

Fractures of the Cranium were by the old writers divided into many species, the name of each being derived from a supposed resemblance of the fissure or fracture to some familiar object. Modern surgeons have rejected this long and difficult list, and instead classed the whole under two heads viz: fractures with & without depression; and these include all possible cases. It was a practice

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with the old operators to use the Trepan in every case of fractured skull; several perforations were usually made along a simple fissure, and this before a symptom of compression was manifest, with the ostensible purpose of preventing the bad effects which sometimes result from such injuries. Fortunately this useless and painful practice is now abandoned. Experience has undoubtedly proved that the object of these repeated perforations is as certainly, and more certainly, accomplished by a rigorous adherance to the Antiphlogistic Treatment. Yet it is not to be understood from these remarks that the trepan is never demanded in cases of simple fissure. Even Abernethy (and the opinion of no one more merits our attention) admits, "the operation of the trepan is frequently performed in cases of simple fracture, and that very judiciously and properly; but it is not performed because the bone is broken or cracked; a crack or fissure of the skull can never require perforation; or that the Dura Mater under it be laid bare; the reason for doing this springs from other causes than the fracture, and those really independent of it; they spring from the nature of the mischief which the parts within the cranium have sustained, and

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not from the accidental division of the bone. From these arise all the threatening simptoms, and from these the necessity & vindication of performing the operation of the trepan." This rule for applying the Trepan, according to the same high authority, should guide in cases of depressed fracture, not less than in those of fracture without depression. Bad effects, particularly compression of the brain, are to be apprehended in every case of depressed fracture. Yet such is not uniformly the result, in as much as many instances are on record, where, without assistance from the surgeon, patients thus injured have recovered, and without permanent injury or deformity. Many cases, illustrative of the position assumed, might be adduced, but the fact is now so generally admitted that it would be but waste of time, both, to the professor who may be so unfortunate as to be compelled by duty to peruse this piece, and to myself. In every instance then the surgeon, in determining on the operation, must be directed by circumstances; we are persuaded that very few cases, comparatively speaking, will require the instrument. I have had the good fortune during the

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last summer, of attending several cases of fractured skull, and in every instance a speedy recovery was the result, excepting one, in which case my preceptor performed the operation. Nothing, however, could have given relief in this case, as the child fell directly on its head, from the third story of a high house. These few cases, and the uniform success of my preceptor, who seldom uses the trepan, may have biased my mind; yet I feel confident in the correctness of the position assumed, that the old operators were too hasty in the employment of this instrument, and that the operation is not demanded in every case of depressed fracture. (We shall not, as we deem it unnecessary, describe the manner of operating with the Trepan.)

From a slight blow or fall, even where no marks of violence are perceptible on the scalp, the most serious consequences have often resulted. The first indication of a transfer of irritation to the membranes or brain, is pain under the part where the injury has been received. This gradually increases; high fever succeeds; pulse is quick and hard; skin hot; patient restless; and if no remedies be used to allay the inflammation, the

symptoms increase and in a short time become violent; the patient is kept constantly awake, or if asleep, it is broken and unrefreshing; the pain extends over the whole head. Should a wounded scalp be the precursor, about this time the wound changes its appearance; discharges a thin sanies, instead of healthy pus, and the lint adhere. Should the Periosteum be in sight, it will be found to have changed its colour; it will be darker than usual; and be found seperated from the bone. Such symptoms denote the seperation of the Dura Mater from the Cranium, and the formation of matter between, and generally risult in evident simptoms of compression. The injury is sometimes even more extensive. The inflammation may extend to the other membranes, and the brain, and then instead of matter under the Cranium upon the D. M. it may be beneath it; or between the P. M. and brain; or in the ventricles of the brain. All this train of evils is the effect of inflammation, produced by external violence, and yet without any outward mark. In other cases the violence may be so great as to rupture the blood vessels immediately. Then there will be an effusion of blood, and compression the probable result. Compression

whether produced by depression of bone, the formation of matter, or the extravasation of blood, is characterised by the following symptoms "The pulse will be found slow and regular; the pupils of the eyes greatly dilated, and insensible to the strongest light; the breathing stertorous, slow and difficult; the limbs loose, and yielding, and sometimes paralitic: the insensibility complete, so much so that the patient cannot be roused by the application of the strongest stimulants." Had one of the old Surgeons been called to a patient in this situation, not a moment would have been lost. The trepan, the trepan would have been the reiterated call; nor would they have hesitated to make several perforations in the course of the same fracture. Doubtless this procedure in a majority of cases (I mean a single perforation) would be correct, but frequently entirely unwarranted. According to some of the highest authorities in our profession, the Trepan should not be first employed. Venesection, mild purges (when the case will warrant delay) are the first steps. If these fail to restore, the propriety of the operation is unquestionable. The point now to be determined is, where to apply the instrument.

If a wound or bruise or any external mark exists, it is easily determined. But where no such land mark is discoverable, it becomes a matter of the greatest doubt and uncertainty. Should the symptoms be urgent, no time is to be lost, the operation must be resorted to. There are considerations, which, under such circumstances, should have their influence in directing the Surgeon. If pain is felt from pressure on any part, a useful hint is suggested. The kind of instrument by which the injury was inflicted; the relative position of the two individuals &c. &c. or if the patient has fallen, the manner of falling; the direction &c. &c. all these should be carefully examined, and we are persuaded they will seldom fail to give some useful hint. Should they, however, and the operation be positively demanded, let it be over some large blood vessel, as the Middle Artery of the D. M. and for this reason, the probability of extravasation here is greatest. It is scarcely necessary to remark, that after the perforation, the depressed bone should be elevated, blood or matter evacuated; wound lightly dressed; patient confined to the antiphlogistic regimen, and bled and purged - pro re nata - for four or five weeks. ℞.....

Sometimes after a perforation, the brain protrudes through the opening, and gradually increasing produces what is called Fungus Cerebri. The treatment for such a tumour is light dressings, with occasionally ~~light~~ moderate pressure.

Even after the removal of a portion of the bone, the surgeon may be greatly embarassed. The D. M. may be perfectly clean, exhibiting no sign of blood or effused pus; it may not even be detached from the cranium. Thus situated he should remember that the injury may be deeper seated; the fluid may be under the D. M. or still farther from the surface. Here the question would arrise should this membrane be perforated. Where no hopes of recovery could be indulged unless the brain be immediately relieved, no one would hesitate to proceed. But the case should be a desperate one. The common method is merely to puncture this membrane with a lancet or other sharp instrument. Sir A. Cooper, however, remarks, that he has never known a single case of recovery where the D. M. alone has been punctured. But strange as it may appear, he has related several cases of complete recovery where the D. M. & P. M. were both divided. Accordingly he follows this practice, and strenuously

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advises it – In attending a lecture of Dr. Hopkinson, very lately, I heard a suggestion from him, which, so far as I know, is original. be this as it may, it appeared to me to merit attention. The D. M. is known to consist of two lamina or layers, an internal and an external. It occurred to him, that the puncture ought not to be made directly through the two, but that the external coat should be first divided, the instrument then so directed as to pass between the two a short distance, and then through the internal. The orafice could be easily dilated until any fluid should be discharged. He thinks that inflammation will not be more liable to follow such a puncture, than the one commonly resorted to, and fungus cerebri not so likely to occur. Yet, however performed, this is a dangerous operation, and should not be resorted to, unless the life of the patient is in immediate danger.

Compression is not always the result of severe blows on the head. The person is more fequently only stunned, as it is stated in familiar language; or in medical language he suffers a concussion. These two affections, Compression & Concussion are sometimes so intimately blended in the same case, that it is difficult to determine under which the patient labours. Thus a person will receive a severe

blow; symptoms of concussion appear; by the violence a vessel is ruptured; by the time the system has recovered from the effects of concussion, a sufficient quantity of blood is extravasated to bring on compression, the patient being all the while insensible. In such a case great doubt must exist — The symptoms of simple concussion are, Trembling; vertigo; sickness of stomach; loss of mental faculties; partial dimness of sight. According to Mr S. Cooper when the blow has been very severe, the following will be the symptoms. At first the patient is stunned and in a state of total insensibility; the extremities are frequently cold, his pulse weak, slow, and intermitting; his respiration hardly perceptible; his powers of motion abolished. The following symptoms then will distinguish Concussion and Compression. In the former the pupil is either moderately dilated or contracted; in the latter greatly dilated; in the first the pulse is weak and tremulous; in the latter slow and regular; the former without sterterous breathing; the latter always attended with it; the former is always accompanied with sickness of stomach; the latter never. In some cases these will be variously combined, and the true nature of the injury difficult to determine.

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The treatment in cases of concussion next claims our attention. The antiphlogistic regimen, mild purgatives; cold applications to the head, after shaving it; keeping the head elevated, will generally be sufficient. We should be very cautious not to bleed too soon; not until reaction is established. we then bleed to keep down inflammation.

We have endeavoured to give our ideas on this subject in a concise maner. I am conscious that this paper can afford but little interest. The sentiments are stale and hackneyed. Yet it should be recollected that without experience, no man can write on such a subject. We have intentionally omitted much, which might have been properly introduced. I have aimed particularly at brevity, sacrificing ease of style, and sometimes more fear, perspicuity, to attain it. We will conclude in the words of Mr. Potts, "the peculiar circumstances of each individual case must furnish direction to the surgeon for his particular conduct. The parts which are depressed must be elevated; such as are loose and cannot be brought to lie even, such as cannot be prevented from pressing on the membranes, or such as wound and irritate it, must at all events be taken away. The free discharge of blood and

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lymph at present, and matter in future, must be provided for, and therefore every symptom and appearance must be carefully and earnestly attended to, least the most proper opportunity of giving assistance be not embraced. Italiam! Italiam! F.J.